The term Platypoda, founded to include all the Pectinibranchiate Prosobranchs except the Heteropoda, is here restricted and made to apply, without reason given, to the Tænioglossa other than the Heteropoda.

Those interesting and somewhat anomalous genera *Siphonaria* and *Gadinia*, Mr. Cooke, in accordance with the conclusions lately arrived at by Köhler, Haller and Plate, places with the Tectibranchiata, creating for them the sectional name of Siphonarioidea. Pelseneer, we may incidentally remark, in his "Recherches sur divers Opisthobranches," which has only just been published, objects to this conclusion of his German *confrères*, and seemingly on very good grounds.

The Brachiopoda, which are incorporated at the end of the volume, are subdivided into "recent" and "fossil." The former (pp. 463-88) have been undertaken by one of the editors, Mr. A. E. Shipley; the latter (pp. 491-512), by Mr. F. R. Cowper Reed.

Mr. Shipley's chapter is a compact little summary, pithily written, and whilst not erring on the side of popularity, ought to be readily followed by any average student or reader.

It consists almost entirely of anatomical description, embryology, &c., for in "habits" the Brachiopoda are extremely deficient, preceded by a short sketch of the historical bibliography of the group, and followed by a few notes on their distribution, with a synopsis of their classification by Davidson.

Mr. Shipley concludes that the affinities of the Brachiopoda "seem to be perhaps more closely with the Gephyrea, and with *Phoronis*, than with any of the other claimants" which have from time to time been advanced.

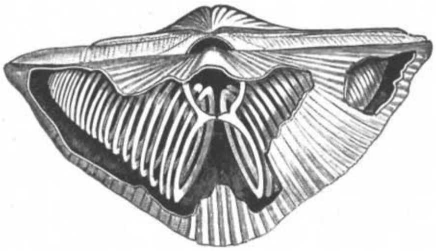

FIG. 3.—*Spirifer striata*, Carboniferous Limestone.

Mr. Reed, on the other hand, by the nature of his subject, is reduced to a description of the shell, especially emphasising such features as indicate anatomical structure and to a classification or "Synopsis of Families." The latter closely approximates the classification employed by Zittel in his "Handbuch," and hence can hardly be said to embody the very latest researches. Schuchert's classification should, we think, at least, have been referred to. Some allusion, too, ought to have been made to *Trematobolus*, which its discoverer, Mr. G. F. Matthew, describes as possessing articulate valves, though it is allied to the Obolidæ. Mr. Reed's descriptive writing must be accorded equal praise with that of Mr. Shipley for clearness of style.

Through the kindness of the editors and the publishers, we are enabled to reproduce some of the illustrations in the text. These of themselves should serve to distinguish "The Cambridge Natural History" from most of its competitors for popular favour, with their plentiful reproduction of ancient blocks, now, alas, too familiar to the eye, and by no means always joys for ever.

NOTES.

THE Ladies' soirée of the Royal Society took place yesterday evening, at the time NATURE went to press.

AN unknown donor has given to the University of the City of New York, funds for a central building, on University Heights, for a library, museum, and hall, so arranged that all may be turned into a library capable of holding 1,000,000 volumes. The gift will amount to 250,000 dollars, being the largest ever received in the sixty-six years of the existence of the University. The only condition is that the name of the donor shall never be revealed.

ARRANGEMENTS are being made by the Marine Biological Association for a series of dredging and trawling expeditions during July, August, and September, to investigate the fauna and flora of the outlying grounds between the Eddystone Rocks and Start Point. In order to make the results as complete as possible it is extremely desirable that the investigation of each group should be carried out by a competent naturalist. Zoologists and botanists who are willing to take part in these expeditions, or to assist in working out the material collected, are requested to communicate with the Director, the Laboratory, Plymouth.

THE summer meeting of the Institution of Naval Architects was opened at Paris on Tuesday, when Lord Brassey delivered his presidential address, and several papers were read and discussed. In the afternoon the members of the Institution visited the Paris Observatory and the Arts et Métiers, and a banquet was given at the Hôtel Continental in the evening. After the close of the meeting, we shall give a report of the proceedings.

THE annual meeting of the Société des Amis des Sciences was held at Paris last week. The Society was founded by Thénard in 1857, for the purpose of affording assistance to men of science or their families. It numbers more than two thousand members or subscribers, and since its foundation has distributed nearly £50,000 to deserving investigators. Grants are only made to persons who have had papers or memoirs presented to the Academy of Sciences, or who have published papers of equal merit to those approved by the Academy. The Society lays stress on the fact that the grants must not be regarded as charitable doles, but as rewards for services to science, and of a similar nature to the pensions which a grateful country gives to its servants. The awards are therefore publicly announced, and are looked upon as honours for meritorious work.

THE Committee of the American Public Health Association, appointed to determine the possibility of establishing co-operative investigation into the bacteriology of water supplies, have made arrangements for a conference of bacteriologists to be held on June 21 and 22, in the Academy of Medicine, New York city. The conference will consider how to obtain increased exactitude in the details of bacteriological research, and establish standard methods. The conference will, in fact, attempt to establish some common ground-plan for systematic work in bacteriology in general, and in the bacteriology of water supplies in particular. The Bacteriological Departments of many State and Provincial and Municipal Boards of Health will be represented at the conference, as also the principal universities of the United States and Canada.

IN the eyes of the law, the Royal Agricultural Society is not a scientific institution which can claim exemption from local rates. It was decided in the Queen's Bench Division on Tuesday, that, as the funds of the Society are not exclusively applied to the purposes of science, but are used to promote "the comfort and welfare of labourers," the Society does not come within the statute under which exemption from rates is claimed.

COLONEL J. WATERHOUSE has been elected President of the Photographic Society of India for the current year.

THE summer meeting of the Geological Society of America will take place at Springfield, Massachusetts, on August 27 and 28.

We learn from *Science* that nearly a thousand dollars have been subscribed in the United States towards the memorial to Helmholtz.

This year's conversazione of the Institution of Electrical Engineers will be held in the Galleries of the Royal Institute of Painters in Water Colours, on Wednesday, July 3.

The third International Congress of Physiology will be held at Berne, from September 9 to September 13. An exhibition of physiological apparatus will be held at the same time. Those who desire to become members, or to read papers, should communicate with Prof. H. Kronecker, Berne, before August 1. The subscription is ten francs.

Several clearly marked earthquake disturbances have been felt at Florence during the past week. A strong shock, followed by two slighter shocks, was felt there at 1.36 a.m. on Thursday last. The shocks have done no damage in Florence, nor, so far as can be learned, in the surrounding country. The earthquake was most violent at Pontassieve, Rignano, and San Casciano.

Sir Samuel Wilson, whose death is announced, was greatly interested in science and education. Among other generous acts, he presented £30,000 to Melbourne University in 1875. He was Vice-President of the Melbourne International Exhibition of 1880, and a Royal Commissioner for the Fisheries Exhibition.

Among the recent appointments abroad we notice the following:—Dr. Celakovsky to be Professor of Pharmacology in the Bohemian University at Prague; Dr. Rohde to be assistant in the Zoological Institute at Breslau; Dr. F. Trendelenburg, Professor of Surgery in Bonn University, to succeed the late Prof. Thiersch at Leipzig; Prof. J. v. Kries to be the late Prof. Ludwig's successor at Leipzig; Dr. F. Schütt, of Kiel, to Greifswald University as Professor of Botany, and Director of the Botanical Gardens and Museum; Dr. v. Knorre to the new chair of Electro-chemistry in the Technical High School at Charlottenburg; Prof. A. Overbeck, of Greifswald, to be Professor of Physics in the University of Tübingen; Dr. Hermann Struve to be Professor of Astronomy in Königsberg University; Prof. E. Koken to be Professor of Geology and Mineralogy in Tübingen; Prof. R. Brauns to be Professor of Geology and Mineralogy in Giessen; Dr. T. Smith to be Professor of Applied Zoology in Harvard University.

In all parts of the British Islands, and especially over England, the weather has continued persistently dry; in the neighbourhood of London the total fall during the first eleven days of June did not exceed half a tenth inch, and the aggregate fall since the beginning of May, a period of six weeks, was but little over half an inch. The *Weekly Weather Report* of the 8th inst. showed that the amount of rainfall since the beginning of the year was below the average in all districts, except the north-east of England. In the west of Scotland the deficiency amounted to 10·4 inches. High summer temperatures have occurred during the past week in many parts of the country, the shade readings having reached 84° in the east of Scotland, and 83° in the south of England. In London, readings of 80° were recorded both on Saturday and Sunday last.

The Whitsuntide party at the Port Erin Biological Station included the following naturalists:—Mr. F. W. Gamble (Owens College), Mr. W. I. Beaumont (Cambridge), Dr. H. O. Forbes Liverpool Museum), Mr. A. Leicester (Southport), and Prof. R. Boyce, Mr. A. Scott and Prof. Herdman, from Liverpool. Dredging, tow-netting, shore collecting, and laboratory work were carried on much as usual. Amongst the more noteworthy animals obtained were *Polygordius* sp., *Sarcobotrylloides* sp., *Embletonia pulchra*, *Elysia viridis*, and *Cynthia morus*. The tow-nets contained some fish eggs, but fewer than at Easter. Diatoms and gelatinous Algæ were nearly absent; Copepoda and larval forms were present in great abundance. Prof. R. Boyce and Prof. Herdman have commenced an investigation on the effect of surrounding conditions upon oysters, and their connection with disease. A number of oysters have been laid down in different parts of Port Erin bay and on the shore, and others are being experimentally treated with various fluids and food matters in the aquarium. Mr. W. I. Beaumont stays on for some weeks at the laboratory studying the Nemertines of the district, and the Rev. T. S. Lea goes to Port Erin shortly to assist Prof. Herdman in working out the detailed "zoning" of the shore and the distribution of the littoral animals.

The general arrangements for the sixth International Geographical Congress, to be opened in London towards the end of next month, are made known in a circular just distributed. The Congress promises to be truly international, for delegates have been appointed to represent Governments and Geographical Societies in all parts of the world. The provisional programme of the meetings is as follows:—The Congress will be opened on Friday, July 26, at 9 p.m., when short addresses of welcome will be delivered by H.R.H. the Duke of York, Honorary President, and by Mr. Clements R. Markham, President. On the following day, Mr. Markham will deliver his inaugural address, after which the Congress will meet in two sections to discuss papers on geographical education, by Profs. Levasseur and Lehmann, and others; and on mathematical geography, especially the use of photography in surveying, by Colonel Laussedat, Colonel Tanner, and others. On Monday, July 29, a general meeting of the Congress will discuss the subject of Arctic and Antarctic exploration, introduced by Prof. Neumayer and Admiral A. H. Markham. In the afternoon two sections will be formed, in one of which questions in geodesy will be treated by General Walker and M. Lallemand, while in the other papers will be read by Prince Roland Bonaparte on glaciers, and M. Martel on spelæology. On July 30, report of Committees and papers on the proposed map of the world on the scale of 1 : 1,000,000, and on international geographical bibliography, will be presented at the general meeting, and two sections will then deal with oceanography, and with the orthography of place names. On Wednesday, July 31, Sir John Kirk will initiate a discussion on Europeans in Africa in the general meeting, and in the afternoon the sections will consider applied geography (commercial geography) and limnology, the latter to be introduced by Prof. Forel. The general meeting on August 1 will deal with the terminology of land forms, and in the afternoon cartography and other subjects will be treated. On Friday, August 2, the forenoon will be devoted to papers by Baron Nordenskiöld, Prof. Hermann Wagner, and others, on the history of maps; and all the remaining papers will be taken in the afternoon. On August 3 the votes proposed for consideration will probably be discussed, the date and place of meeting of the next Congress considered, and the President will deliver his concluding address. After the close of the Congress, a series of excursions will be organised to places of geological and geographical interest.

The Rev. O. Fisher contributes a short paper on the age of the earth to the *Geological Magazine* fo. June. Arguing in favour of a comparatively thin crust and a liquid substratum, he urges that the continual laving of the bottom of the crust by the molten rock will retard the cooling of the crust, and will produce an effect on the temperature-gradient at the surface similar to that to which Prof. Perry has recently drawn attention (Nature, vol. li. pp. 224–227). If this be the case, then, no trustworthy estimate of the earth's age, based on the present temperature-gradient at the surface, has yet been made.

Dr. M. Cinelli has recently compiled a valuable list of the records of the Vicentini microseismograph at Siena between

July 15 and October 31, 1894 (*Atti, R. Acc. dei Fisiocritici*, v., 1895). An examination of the traces corresponding to seismic movements shows that they exhibit different kinds of oscillations, some short, others long, in period. When the earthquakes occur in neighbouring districts, the disturbance of the instrument is brief and the vibrations are rapid. But, with distant earthquakes, the disturbances last for much longer intervals. They begin with rapid oscillations which generally present several maxima, so as to appear as if distributed in groups; while towards the end, either alone or in company with the former, succeed much slower oscillations, which perhaps correspond to undulatory movements of the earth's crust.

DR. HOEBER has been making some interesting experiments to ascertain whether the presence of water-weeds affects the vitality of anthrax germs in water. For this purpose he constructed small resh-water aquaria, each of which contained about eight litres of ordinary river Main water, some river sand, and a supply of water-weeds, and in addition about 200,000 anthrax microbes. These aquaria were only submitted to diffused light, and were kept at 10° and 19° C., respectively. Dr. Hoeber presumably worked with anthrax bacilli only, but special precautions were not taken to ensure the absence of spores; no anthrax germs, however, could be found after three days at the lower, and four days at the higher temperature, respectively. In his second report to the Royal Society, Prof. Percy Frankland states that *sporiferous* anthrax retained their vitality in ordinary river Thames water for upwards of seven months without losing their virulence; but when exposed to sunshine they were destroyed after eighty-four hours. On the other hand, when using *anthrax bacilli free from spores*, as derived from the dead body of an animal, the same authority (*Proceedings* Royal Society, 1894, p. 549) states that in sterilised river Thames and loch water they were destroyed in about five days at 5° C., and in fourteen days at 13° C.; but that at 19° C. they multiplied enormously, and were present in large numbers on the forty-second day. This different behaviour was found to be due to the bacilli having formed spores in the water at the higher temperature. The danger of anthrax germs gaining access to water depends, therefore, upon the temperature of the water and the presence or absence of spores in the morbific material. Judging by Dr. Hoeber's experiments, it would appear that the presence of water-weeds and the competition of water-bacteria may offer obstacles to the vitality of anthrax bacilli in water.

A SALE of much interest recently took place at the dispersal of the herd of white polled cattle belonging to Mr. R. E. Lofft, of Troston Hall, Bury St. Edmunds. The herd, which comprised twenty cows and heifers and five bulls, represented the old "monks' cattle," descended from the oldest historic breed of cattle in the British Isles—the polled white, with black or red points on the ears, muzzle, rims of eyes, and hoofs. Under the wave of improvement which set in with the work of Bakewell, of Dishley, more than a century ago, the old hornless white breeds no longer enjoyed the pride of place, and Mr. Lofft's herd really embodied an attempt to restore this ancient breed to something like its former position. It is probable that these cattle were originally selected by the monks, who in their day were the leaders of agriculture. Being hornless, the animals would be more easily domesticated, and less adapted to purposes of sport, such as the chase and bull-baiting. After the dissolution of the monasteries, these cattle were dispersed over the country, and mostly became merged in the common local varieties. A few, however, were kept pure, and at the beginning of this century there were two herds in Suffolk, which quite escaped the notice of the late Rev. John Storer, the historian of the breed. It is satisfactory to know that some of Mr. Lofft's quaint cattle were purchased by Mr. Assheton-Smith, of Vaynol Park, Carnarvonshire, where he has a herd of black-eared and black-muzzled white horned cattle, and is now going to keep some of the polled type.

PROF. L. DE MARCHI, the author of an Italian hand-book of Meteorology, has contributed an important essay on the theory of cyclones to the *Pubblicazioni* of the Milan Observatory. The discussion consists of 42 small folio pages and 15 plates, and while giving a general account of recent researches, treats the subject chiefly from a mathematical point of view. The following is a brief summary of the principal results arrived at:—The changes in the shape and path of a cyclone, as well as all the principal dynamic phenomena that accompany it, may be deduced from the equations of the horizontal motion, if account is taken of the distribution of temperature round the cyclone, both as regards that which previously existed in the mass of air subsequently occupied by the cyclone, and that drawn into the same area by the vertical movements produced by the earth's rotation. Therefore in some cases, if not always, it is useless to have recourse to external causes, and particularly to the general circulation of the atmosphere, to explain the persistence, change of form, or the motion of a cyclone. The general circulation may be the determining cause of a cyclone at a given point; its propagation, or the successive transference of cyclonic conditions to contiguous masses of air, is determined and maintained, at least in some cases, by the disturbances of thermic equilibrium caused by the sun at the surface of the earth, and induced by the earth's rotation.

THE old and fascinating problem concerning the manner in which the ether moves with or through matter has been attacked by Herr L. Zehnder, who contributes an interesting paper on the subject to *Wiedemann's Annalen*. He endeavoured to decide whether the ether is pushed along by atoms or bodies, or whether it passes through them without resistance, or, finally, whether only a portion of the ether adheres to the particles of bodies, and this portion only is carried along. The apparatus used consisted of a cast-iron cylinder in which a piston moved air-tight. A narrow tube led out from one end of the cylinder, doubled back upon itself, and returned by the other end. Now if the cylinder was exhausted of air, and the piston pushed the ether before it, the latter would stream through the narrow tube with a velocity greater than that of the piston in the ratio of the sectional areas of the cylinder and the tube. This ratio was 560, and exhaustion was carried to 1-40,000th of an atmosphere. To test the motion of the ether, a beam from a brilliant sodium flame was passed through two thick parallel glass plates, the second one being silvered at the back. This plate, by its two reflecting surfaces, split the beam into two, each of which travelled through one portion of the narrow tube. The two beams, reflected near the cylinder by a rectangular prism, were recombined by the same thick plate and returned along the way they had travelled, being finally reflected into the reading telescope by the first plate. Interference fringes were thus produced in the field of view, the motion of which would have indicated a motion of the ether. But no such motion was observed when the tubes were thoroughly exhausted, so that it must be concluded that the ether passes freely through solid bodies. The corollary to this conclusion, that there is a relative motion between the earth and the luminiferous ether, though investigated by the author by means of a new and ingenious apparatus on the Rosskopf, near Freiburg, could not be proved.

THE thirteenth part of Kerner and Oliver's "Natural History of Plants," just published by Messrs. Blackie and Son, refers chiefly to the production and characteristics of plant hybrids.

THE June *Journal* of the Chemical Society contains, in addition to papers read before the Society, and abstracts of other papers, a description of the life-work of the late Prof. J. C. G. de Marignac, by Prof. P. T. Clève, together with a portrait of that lamented chemist.

MR. C. L. PRINCE has sent us details of observations made made by him at Crowborough Hill, Sussex, during the great frost of January and February last. In his report, he contrasts the period with other periods of severe cold which have occurred during the present century.

THE Guide-books to Middlesex and Hertfordshire, published by Messrs. Iliffe and Son, will direct the tourist's steps aright, and afford him instruction upon points of more or less historical interest, but they furnish very little information with regard to the counties from a scientific point of view.

WE have received a "Guide to the Bristol Museum," by Mr. Edward Wilson, the Curator. The Museum contains a large number of valuable objects, and geology is very well represented. With this guide to assist them, students of science must find the collections more helpful than they used to be.

THE Lumleian Lectures on certain points in the ætiology of disease, delivered by Dr. P. H. Pye-Smith, F.R.S., before the Royal College of Physicians in 1892, and the Harveian Oration, delivered before the College in the following year, have been published in volume form by Messrs. J. and A. Churchill. The volume also contains a memoir of the life and works of Harvey.

THE fact that the report of the Marlborough College Natural History Society for the year 1894 runs into one hundred and fifty pages, may be taken as an indication that the Society is in a satisfactory condition. The report contains summaries of lectures delivered during the year, a description of the College museum and the collections in it, notes and observations, and accounts of the work of sections; it is altogether a creditable production.

PUBLISHERS' catalogues are frequently of great assistance to librarians and bibliographers. A catalogue lately issued by W. Engelmann, of Leipzig, belongs to that class of useful publications. It contains descriptions of all the books, memoirs, and periodicals published by Engelmann from the foundation of the firm to February of this year. The books are arranged alphabetically according to the authors' names, and are also classified into subjects. There is, therefore, no difficulty in finding a volume of which the author or the title is known.

THE annual report of the Zoological Society of Philadelphia shows that, but for grants made by the City Councils, the Gardens would have had to be closed, the receipts from admissions having been too low to meet expenses. We notice that, in addition to nearly three thousand free admission tickets to charitable institutions, donors, &c., the Society issued fifty thousand tickets to the Board of Education, for the admission of pupils of the elementary schools. The collection of animals now comprises 251 mammals, 416 birds, and 245 reptiles and amphibians, or a total of 912 specimens.

THE new editions received during the past few days include the second part of Dr. Michael Foster's standard "Text-book of Physiology" (Macmillan), dealing with the tissues of chemical action and their respective mechanisms, and with nutrition. The work, which is now in its sixth edition, has been brought into line with the present state of physiological knowledge. Messrs. J. and A. Churchill have published a sixth revised edition of "A Treatise on Practical Chemistry," by Prof. Frank Clowes; and Messrs. Smith, Elder, and Co. have published a fourth edition of Marshall and Hurst's "Junior Course of Practical Zoology."

THERE are only four papers in the June number of *Science Progress*, but each of them is an important contribution to scientific literature. Prof. Marshall Ward describes the growth of knowledge concerning the fixation of free nitrogen by plants. He briefly states the aspects of the question, and gives references to the most important papers upon it. A valuable paper on the ratio of the specific heats of gases is contributed by Mr. J. W. Capstick; it affords interesting reading in connection with the recent discussion in these columns of points arising from the kinetic theory of gases, and also with reference to the atomicity of argon. Mr. J. W. Rodger concludes his most useful statement of the progress made in physical chemistry during 1894. The papers are classified in such a manner that it is easy to find what was done in every branch of the subject. The fourth paper is by Mr. J. E. S. Moore, and has for its subject "The Protoplastid Body and the Metaplastid Cell."

THE current *Journal* of the Anthropological Institute (No. 4) contains the presidential address delivered by Prof. A. Macalister, F.R.S., in January last. The Institute by no means possesses a membership in proportion to the importance of the subjects fostered by it. "When we consider," remarks Prof. Macalister, "the wide-reaching importance of the myriad of practical problems with which we as anthropologists are concerned, and the useful work which the Institute has done in the past, it is scarcely conceivable that our membership of 362 should be taken as representing the number of persons to whom these matters are interesting. And further, it is little short of a national disgrace that in the largest empire of the world, within whose bounds there are nearly as many separate peoples, and tribes and kindreds and tongues as in all the other nations put together, there is no Imperial department whose function should be to collect and classify the facts of the physical, psychical, and ethical histories of our fellow subjects."

TWO years ago the American Philosophical Society, of which Benjamin Franklin was the first President, held a meeting, at Philadelphia, in commemoration of the 150th anniversary of its foundation. The meeting was attended by delegates representing learned societies and institutions in most parts of the world, and was completely successful. The volume containing full reports of the proceedings has only lately appeared, but the delay in its publication is probably due to the many addresses, memoirs, and plates contained in it; for the printing of the communications, and the preparation of nearly sixty plates, necessarily takes time when the work is so carefully done as it seems to be in the volume before us. Among the addresses is one by Dr. Roberts (the delegate of the Royal Astronomical Society), entitled "Illustrations of Progress made during Recent Years in Astronomical Science." This address is illustrated by thirteen plates representing some of Dr. Roberts' classical photographs. A richly illustrated paper on Tertiary Tipulidæ, by Dr. S. H. Scudder, has already been noticed in these columns (vol. 50, p. 111). Seven plates illustrate Dr A. S. Packard's "Study of the Transformation and Anatomy of *Lagoa crispata*, a Bombycine Moth," and sixteen embellish a paper by Prof. A. Hyatt on "The Phylogeny of an Acquired Characteristic." Limits of space prevent us from referring to the many other papers. Suffice it to say that the volume is a worthy memorial of a remarkable meeting.

THE *Zeitschrift für Anorganische Chemie* gives a very complete account of the synthesis of metallic ores by crystallisation from solution in the appropriate molten metal, by Friedrich Roessler. The work includes the production of crystalline sulphides and selenides of such metals as lead, bismuth, and silver, and of arsenides, antimonides, and bismuthides of platinum, palladium, and gold. The production of silver bismuth sulphide will serve to illustrate the method followed. Twenty grams of bismuth were melted in a covered crucible, and two grams of silver sulphide were added. By solution of the slowly cooled product in nitric acid of specific gravity 1·1, there remained small dark crystals intermixed with silver-white crystals. The latter consisted of a bismuth-silver alloy, and, in time, dissolved in the acid. On drying, the remaining dark crystals were found to possess a steel-blue lustre. They formed pretty groups of octahedra (figure given in the paper) attached in rows. Analyses proved their composition to be well represented by the formula, $AgBiS_2$ or $Ag_2S + Bi_2S_3$.

IN the current number of the *Comptes rendus*, M. Clève gives the results of a determination of the density of the new gas helium by M. Langlet. The gas, extracted from cleveite, was freed from hydrogen by passage over red-hot copper oxide, and from nitrogen by metallic magnesium. It contained no argon. The density was found to be notably less than the number given by Prof. Ramsay, being 0·139 (air = 1) or 2·02 (hydrogen = 1). The determination of the specific heat of the gas has been taken in hand by the same investigators; their results will be awaited with much interest.

THE additions to the Zoological Society's Gardens during the past week include two Rhesus Monkeys (*Macacus rhesus*, ♂ ♀), from India, presented, respectively, by Sir Henry W. Peek, and Mr. R. Edmeades; a Patas Monkey (*Cercopithecus* (*ruber*, ♀), from West Africa, presented by Mr. C. H. Armitage; a Campbell's Monkey (*Cercopithecus campbelli*, ♂), from West Africa, presented by Miss L. Panther; a Herring Gull (*Larus argentatus*), British, presented by Mr. J. T. Gorvin; three Ocellated Skinks (*Sepsocellatus*), a —— Skink (*Chalcides sepoides*), a Defenceless Lizard (*Agama inermis*), two Diademed Snakes (*Zamenis diadema*), two —— Snakes (*Cœlopeltis moilensis*), four Egyptian Eryx (*Eryx jaculus*), two Cerastes Vipers (*Vipera cerastes*), two Egyptian Cobras (*Naia haje*), from Lower Egypt, presented by Dr. John Anderson, F.R.S.; a White-crowned Monkey (*Cercocebus æthiops*), a White-necked Stork (*Dissura episcopus*), from West Africa; two White Pelicans (*Pelecanus onocrotalus*), from North Africa; a Barraband's Parrakeet (*Polytelis barrabandi*), from New South Wales; three Hamadryads (*Ophiophagus elaps*), from India; fifty —— Tree Frogs (*Hyla* ——), from America, deposited; a Red Deer (*Cervus elaphus*), an Argus Pheasant (*Argus giganteus*), three Ruddy-headed Geese (*Bernicla rubidiceps*), bred in the Gardens.

OUR ASTRONOMICAL COLUMN.

COMET 1892 V. (BARNARD).—The orbit of this comet, which had been discussed by Mr. J. G. Porter (*Astronomical Journal*, No. 310), has recently been made the subject of a further investigation by M. J. Coniel; but the elements, resting as they do on a very few observations, still remain uncertain to a considerable extent. The comet was discovered, photographically, on October 12, 1892, and regular observations do not extend beyond November 22, 1892, about six weeks only from the date of discovery; but an isolated observation made at Nice on December 8, not taken into the discussion by Mr. Porter, induced M. J. Coniel to reopen the inquiry, with the hope of making a better determination of the period. Mr. Porter's orbit represented this observation within the errors −0·05s. and −12″·9, in R.A. and Declination respectively; and considering the difficulty of the observation, such a discrepancy is not more than might be anticipated, and consequently does not suggest the possibility of decided improvement. The feature of the more recent discussion is to show that the observations can be equally well satisfied with elements in which the mean daily motion is altered by some 26″. This is not quite the twentieth part of the whole motion, therefore the period is uncertain to its twentieth part, or about 0·3 of a year.

M. Coniel judges that the uncertainty in the mean motion may extend to 25″ on either side of his result, and that the period may lie between 6·23 and 6·84 years. The consequence of this uncertainty is that the search for the comet at future returns must be greatly extended. In 1899, the sweeping ephemeris must be based on a mean motion corresponding to 6·65–6·84 years. In 1905, the comet may be visible if the period lies between 6·34–6·55 years; while in 1911, and even 1912, the return may be expected with still other and possible values of the mean motion. No near approach to Jupiter will take place during this interval, but the situation of the orbit is such that the comet can approach both Jupiter and Mars. Confining attention to the most probable period (6·52 years), the comet approaches the orbit of Jupiter within 0·07R, in Hel. Long. 207°, and that of Mars within 0·012R, in Hel. Long. 28°. This interest in the comet's path is still further increased by the speculation, due to M. Schulhof, that this comet formed originally a part of Wolf's comet, from which it possibly separated in 1815.

MEASUREMENT OF RADIAL VELOCITIES.—The methods at present employed for the measurement of the movements of the heavenly bodies towards or away from the earth usually involve the use of a comparison spectrum, whether the observations be made by eye or by photography. In special cases, however, other methods are employed, as, for example, the use of telluric lines by Dunér in the measurement of the sun's rotation. It has not, however, yet been considered practicable to utilise the objective prism for the work, on account of the difficulty of obtaining reference spectra. A new method, which has the great advantage of being applicable to spectra photographed with or without slits, has recently been suggested by M. Orbinsky, of Odessa. (*Astr. Nach.* 3289.) The principle of the method is based on the fact that the displacements of lines are different at different wave-lengths, so that the distance between two lines in a spectrum depends upon the velocity of the source of light; the higher the velocity, the greater or less will be the distance between any two lines in the spectrum, according as the source of light is approaching or receding, and providing the dispersion be sufficient, it may be possible to measure the velocities by this means. Obviously the measurements are much more delicate than the direct measures of the displacements. In practice it is proposed to employ reference stars, the velocities of which have been determined in the ordinary way by photographic comparison spectra of hydrogen or iron. One of these being photographed on the same plate as the star under investigation, the results will give the velocity relatively to the comparison star, and hence the absolute velocity. The instruments employed should give the greatest possible range of wave-lengths, and it will be specially advantageous to obtain as great a difference of dispersion as possible between the extreme ends of the spectrum. It is shown by actual figures that the measurements are quite practicable, both in the case of the Potsdam spectrograph and in the objective prism employed at Harvard College. It is in the case of the latter class of instruments that the method seems most likely to be of practical value.

TWO REMARKABLE BINARY STARS.—Apart from the binary stars which can only be recognised as such by the aid of the spectroscope, the two binary stars of shortest periods at present known are κ Pegasi and δ Equulei. The orbits of these have been redetermined by Dr. See, using all available observations, many of which are due to the industry of Profs. Burnham and Barnard. The elements deduced are as follows (*Astr. Nach.* 3285, 3290):—

	κ Pegasi.	δ Equulei.
P	11·42 years	11·45 years
T	1896·03	1892·8
e	0·49	0·14
a	0″·4216	0″·452
ι	81°·2	79°·05
☊	116°·25	22°·2
λ	89°·2	0°·0
n	−31°·5236	−31°·441

Prof. Burnham has repeatedly called attention to the importance of systematic observations of rapid binaries with large telescopes, so that we should in a few years get good orbits, which in the case of most binaries would require the observations of centuries.

It will be seen that there is still a great gap between the telescopic and spectroscopic binaries, but it is quite possible that as the powers of both instruments are increased the gap may be gradually shortened from both sides.